SECTION 88

SHIP'S SERVICE GENERATOR SETS

ITEM PAGE

88.1 REFERENCES

(88A) **VOLUME V** – *OWNER - FURNISHED EQUIPMENT*

88.2 INTRODUCTION

This Section covers the Contractor Design and Provide general requirements for installing three (3) OFE Ship's Service Diesel Generator (SSDG) Sets and one (1) OFE Emergency Diesel Generator Set, along with specific requirements given for the individual components (i.e., engine, generator, and controls). See Reference (88A).

For WSF Fleet-wide Standardization purposes, End No. 1 of the Vessel shall always be considered the bow, and this designation shall delineate port and starboard, fore and aft wherever they are addressed in the Technical Specification.

88.3 GENERAL

The Ship's Service and Emergency Diesel Generator sets will be Owner - Furnished Equipment (OFE) installed by the Shipyard in accordance with the SSDG Contractor and Propulsion System Integration (PSI) Contractor's Contract Bid Support Documentation, and these Technical Specification.

The Ship's Service and Emergency Diesel Generator Sets will be delivered mounted on structural sub-bases (skids). The sub-base, in turn shall be resiliently mounted by the Shipyard to their foundations using OFE spring/rubber isolation mounts for attenuation of structure-borne noise. The design of the foundation and attachment of the engine and generator shall maintain alignment under all expected conditions including resilient mountings. See Section 50 of the Technical Specification for additional resilient mounting requirements.

BE ADVISED: The Contract Bid Support Package provides OFE documents and drawings in Reference (88A) that contain specific installation instructions setting forth mandated installation procedures and precautions. The Contractor shall provide designs and installations that, at a minimum, meet and address all instructions and requirements as set forth in the OFE documents and drawings.

See Section 74 of the Technical Specification for general piping and material requirements and Section 75 of the Technical Specification for insulation and lagging requirements.

See Sections 56 and 57, respectively, of the Technical Specification for fuel oil and lube oil requirements.

See Section 89 of the Technical Specification for system functional descriptions.

The Contractor shall provide all interconnecting cabling, connectors, hangers, junction boxes, labeling and other items and devices as required to make a complete, functional, and fully operational installation of the Ship's Service and Emergency Diesel Generator Sets.

The Contractor is reminded to ensure that appropriately sized silver plated, closed end crimp style lugs of the proper style and type are utilized in making all generator cable and bus connections. See Section 87 of the Technical Specification for addition requirements.

88.4 SHIP'S SERVICE AND EMERGENCY DIESEL GENERATORS

88.4.1 General Requirements

The Contractor shall provide for, as part of his bid, coordination services, schedule, material, and support of all major component factory trained technical representatives for all factory, OFE SSDG contractor, and all OFE contractors required set up, light off, adjustment, and testing of all OFE SSDG equipment. Assume twenty (20) days, **after** all Shipyard provided equipment and material is installed, operational, satisfactorily tested, and approved by the WSF Representative, for set up, light off, and adjustment testing for each Vessel. All system coordination services shall be identified and scheduled as part of the *Master Construction Schedule (MCS)* Subsection in Section 100 of the Technical Specification.

88.4.2 Installation

The Vessel's electrical service shall be provided by a combination of any two (2) of the three (3) OFE Ship's Service Diesel Generator Sets (although it shall be possible to parallel and connect to the bus, all three (3) generator sets if so desired). The No. 1, No. 2, and No. 3 Ship's Service Diesel Generator Sets shall be all of the same size and have the ability to run any two (2) of the three (3) generator sets in parallel with a third in "stand-by" mode ready to start.

Ship's Service Diesel Generator Sets No. 1 and No. 2 shall be installed in Engine Room No.1. Ship's Service Diesel Generator Set No. 3 shall be installed in Engine Room No. 2. Ship's Service Diesel Generator Set No. 3 shall have an acoustic enclosure to attenuate engine and generator noise when operating the generator set while Crew are working in Engine Room No. 2. The OFE Emergency Diesel Generator shall be installed in the Emergency Diesel Generator Room on the Sun Deck.

The OFE Emergency Diesel Generator Set automatic cranking cycle control circuit shall be Contractor designed and provided in accordance with USCG requirements using the Woodward EGCP-3 LS controller as outlined in Section 89 of the Technical Specification. See Reference (88A) for Emergency Diesel Generator Set cranking cycle control circuit requirements and schematic drawings. The starting system of both the Emergency Diesel Generator and the Ship's Service Diesel Generators will have an interlock of the starter motor to prevent a start attempt after the diesel is running. The Emergency Diesel Generator will have 24 Vdc electric starting and be cooled by a remote radiator with motor driven cooling fan. The Ship's Service Diesel Generators will be compressed air started and have a plate type heat exchanger for cooling the SCAC and a keel cooler for jacket water cooling. Refer to Section 72 of the Technical Specification for requirements for the generator prime movers.

The generators will have a minimum continuous rating of 300 kW, 0.8 P.F., 1800 RPM, 3-phase, 60 Hz, 480 Volts.

The generators will have electric heaters to prevent moisture condensation within the machines. The generator heaters shall be automatically operated, "ON" when the generator is not running, "OFF" when the generator is running interlocked through their respective circuit breakers.

The windings shall be arranged such that external to the machine, the generator appears to be wye wound. The neutral conductor is not to be made accessible, and is not to be brought out of the machine. The neutral connection shall be insulated and taped and clearly identified to prevent accidental connection at a later time.

Each generator engine will be fitted with an electronic digital type governor to provide both isochronous and droop load sharing capability. They shall be powered from dual redundant 24 Vdc battery banks.

Each generator set will be complete with permanent magnet exciter, load sharing and voltage regulation control modules, and shall include local and remote monitoring and control. The generator set shall be pre-lubed and started manually. After receiving a breaker close command, the generator set shall automatically synchronize, close the breaker, assume the load, and load share with the generator already online in no more than twenty (20) seconds.

Each Ship's Service Diesel Generator shall have a pre-lube mode switch for switching to automatic pre-lube or manual pre-lube mode. In automatic Pre-lube Mode, the Pre-lube Pump shall be automatically started at programmed timed intervals. In manual Pre-lube Mode the Pre-lube Pump is started by pressing the "Pre-lube Start" pushbutton. The pre-lube indicating light is "ON" when the Pre-lube Pump is running. A pressure switch in the lube oil line of the generator shall turn "OFF" the Pre-lube Pump when a predetermined pressure is reached.

Generator and excitation system will be capable of providing short circuit current of sufficient magnitude and duration to properly actuate associated distribution system protective electrical devices.

Each Generator shall be provided with a voltage regulator cutout switch and in addition shall have a manual voltage regulator, both located on the front panel of the generator control section of the Ship's Service Switchboard and Emergency Switchboard.

88.5 SPARE PARTS AND INSTRUCTION MANUALS

Provide a list of recommended spare parts and special tools for those items which are Contractor furnished, together with parts lists and instruction manuals necessary to maintain and service provided equipment and accessories in accordance with the requirements of Sections 86 and 100 of the Technical Specification.

88.6 TEST, TRIALS, AND INSPECTIONS

Tests and /or Trials shall be in accordance with this Section and Section 101 of the Technical Specification.

Inspections shall be performed as defined in this Section and in Sections 1 and 2 of the Technical Specification.

88.7 PHASE II TECHNICAL PROPOSAL REQUIREMENTS

See Section 100 of the Technical Specification for requirements regarding technical documentation.

88.8 PHASE III DETAIL DESIGN AND CONSTRUCTION REQUIREMENTS

The deliverables required by Section 100 of the Technical Specification and the Authoritative Agencies, shall be provided during the Phase III Detail Design stage of Work in accordance with the requirements of Section 100 of the Technical Specification:

See Section 100 of the Technical Specification for additional requirements regarding technical documentation.

(END OF SECTION)